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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/744,586	01/26/2001	Kenji Nakao	OGOH:063	1645
7590	12/08/2003		EXAMINER PIZIALI, JEFFREY J	
Roger W Parkhurst 1421 Prince Street Suite 210 Alexandria, VA 22314-2805			ART UNIT 2673	PAPER NUMBER 6

DATE MAILED: 12/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/744,586

Applicant(s)

NAKAO ET AL.

Examiner

Jeff Piziali

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 January 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 5-34, 36, 38-41 and 43-152 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☒ Claim(s) 72 and 96 is/are objected to.
- 8) ☒ Claim(s) 5-34, 36, 38-41 and 43-152 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 January 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☒ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Acknowledgment is made of applicant's claim for foreign priority based on an application filed in Japan on 27 July 1999. It is noted, however, that applicant has not filed a certified copy of the 11/212,718 application as required by 35 U.S.C. 119(b).

Drawings

2. Figures 64-69 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 72 & 96 is objected to because of the following informalities: The Preliminary Amendment, filed 26 January 2001 (Paper No. 5) cancels claims 72 and 96 (see page 2) and provides an amended copy of claim 72 (see page 6) and an amended copy of claim 96 (see page 7). It is unclear if claims 72 and 96 are pending or canceled. Appropriate correction is required.

Election/Restrictions

4. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group 1, claims 5-6, drawn to a reflective liquid crystal display element wherein a scattering gain of the polymer-dispersed liquid crystal layer is set in accordance with a level of refractive index anisotropy of the liquid crystal included in the polymer-dispersed liquid crystal layer.

Group 2, claim 7, drawn to a reflective liquid crystal display element wherein the scattering gain of the polymer-dispersed liquid crystal layer is set in accordance with a thickness of the polymer-dispersed liquid crystal layer.

Group 3, claims 8-12, 29 & 31, drawn to a reflective liquid crystal display element satisfying the relation $50\exp(-0.4d) < SG < 360\exp(-0.47d)$, wherein d is a thickness of the polymer-dispersed liquid crystal layer and SG is a scattering gain of the polymer-dispersed liquid crystal layer.

Group 4, claims 13-17, 30 & 32, drawn to a reflective liquid crystal display element satisfying the relation $50\exp(-1.6\Delta n*d) < SG < 360\exp(-1.88\Delta n*d)$, wherein $d(\mu\text{m})$ is a thickness of the polymer-dispersed liquid crystal layer, SG is a scattering gain of the polymer-dispersed liquid crystal layer, and Δn is its refractive index anisotropy.

Group 5, claims 18-21, drawn to a reflective liquid crystal display element wherein the product of a birefringence of the liquid crystal and a thickness of the polymer-dispersed liquid crystal layer is at least $0.6\mu\text{m}$ and at most $2.2\mu\text{m}$.

Group 6, claims 22-24, drawn to a reflective liquid crystal display element wherein the liquid crystal drops near the border of the substrates are formed substantially as semi-spheres whose great circles contact the substrates; and wherein directors of the liquid crystal inside the semi-spherical liquid crystal drops are arranged substantially uniformly in parallel to the substrates.

Group 7, claims 25-28, drawn to a reflective liquid crystal display element comprising an RGB filter formed on one of the substrates; wherein, when $d(\mu\text{m})$ is a thickness of polymer-dispersed liquid crystal layer, and, among the scattering gains for green light in the polymer-

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dispersed liquid crystal layer, SG_r is a scattering gain of a red pixel region, SG_g is a scattering gain of a green pixel region, and SG_b is a scattering gain of a blue pixel region, then $50\exp(-0.4d) < SG_g < 360\exp(-0.47d)$ is satisfied in the green pixel region; $50\exp(-0.4d) < SG_b < 360\exp(-0.47d)$ is satisfied in the blue pixel region; and $40\exp(-0.3d) < SG_r < 650\exp(-0.4d)$ is satisfied in the red pixel region.

Group 8, claims 33, 34 & 36, drawn to a scattering display element wherein the reflection means scatters and emits light that is incident on the scattering display element, into a range of directions with anisotropy when the scattering/transmission means is in the transmitting state.

Group 9, claims 38 & 39, drawn to a scattering display element wherein a surface of an anisotropic transmission means is provided with protrusions whose curvature in a horizontal direction of the display screen is larger than the curvature in a vertical direction of the display screen.

Group 10, claim 40, drawn to a scattering display element wherein an anisotropic scattering means includes an anisotropic diffraction means.

Group 11, claims 41, 43-56 & 59-63, drawn to a scattering display element wherein bright display is performed when the scattering/transmission means is in the scattering state; and an emission angle modification means, which, when the scattering/transmission means is in the transmitting state, emits light, that is incident on the scattering display element, into a direction such that the emission angle is larger than the incidence angle and the incident light is emitted toward a direction on a side opposite, with respect to a normal on the display surface, and at most 30° .

Group 12, claims 57 & 58, drawn to a scattering display element wherein the incidence angle is different from the emission angle; and the emission angle modification means is configured such that light that is incident on the scattering display element is emitted substantially in a direction back toward the direction of incidence.

Group 13, claims 64-71, drawn to a scattering display element comprising an attenuation means for attenuating an amount of light reflected by the reflection means.

Group 14, claims 72 & 96, drawn to a method for manufacturing a display element comprising the step of forming a resin layer including micro-particles of anisotropic shape on a substrate and providing the micro-particles in the resin layer with a predetermined directionality.

Group 15, claim 73, drawn to a method for manufacturing a display element comprising the steps of forming a resin layer with substantially oblong planar shapes on a substrate; and providing the resin layer with flowability by heating and softening the resin layer, such that a curvature of the planar shapes with respect to a longitudinal direction is smaller than a curvature of the planar shapes with respect to a width direction.

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Group 16, claim 74, drawn to a method for manufacturing a display element comprising the step of providing a surface of the resin layer with a predetermined shape by press-forming while the resin layer is not yet cured.

Group 17, claim 75, drawn to a method for manufacturing a display element comprising the steps of forming a protective film of a predetermined pattern on the resin layer; shaping the resin film by dry etching or sandblasting from a direction that is oblique with respect to the normal on the substrate; and forming a reflective layer on the resin layer after eliminating the protective film.

Group 18, claims 76-92, drawn to a method for manufacturing a display element comprising the steps of forming a first resin layer on a portion of a substrate; forming a second resin layer on a portion of a region including at least a portion of the first resin layer, so as to form a cross-section having a non-symmetric shape; and forming a reflective layer on a region including the non-symmetric shape.

Group 19, claims 93-95, drawn to a method for manufacturing a display element comprising the step of forming a shape having a non-symmetric cross section by partially forming a second resin layer on a portion of a region including at least a portion of the first resin layer and then eliminating at least a portion of the first resin layer or the second resin layer.

Group 20, claims 97, 102, 109, 112, 115, 118, 121, 124, 127 & 142-149, drawn to a scattering-mode liquid crystal display device having luminance - voltage characteristics that exhibit a peak in the luminance level as the liquid crystal layer is changed from the scattering state to the transmitting state.

Group 21, claims 98, 100, 103, 105, 107, 110, 113, 116, 119, 122, 125, 128, drawn to a scattering-mode liquid crystal display device wherein the scattering mode is a normally-white mode, in which the liquid crystal layer is in the scattering state when no voltage is applied, and the display is bright; having luminance - voltage characteristics in which, as the applied voltage is increased from 0V, the luminance level increases once from an initial level until it reaches a peak, and then decreases to substantially zero.

Group 22, claims 99, 101, 104, 106, 108, 111, 114, 117, 120, 123, 126 & 129, drawn to a scattering-mode liquid crystal display device wherein the scattering mode is a normally-black mode, in which the liquid crystal layer is in the transmitting state when no voltage is applied, and the display is dark; having luminance - voltage characteristics in which, as the applied voltage is increased from 0V until reaching a threshold voltage, the luminance level is substantially zero, and as the applied voltage increases beyond the threshold voltage, the luminance increases until it reaches a peak, and then decreases.

Group 23, claims 130-135, drawn to a method for driving a scattering-mode liquid crystal display device wherein the display device is driven by bias driving.

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Group 24, claims 136-141, drawn to a scattering-mode liquid crystal display device having luminance - voltage characteristics in which, as the liquid crystal layer changes from the scattering state to the transmitting state, there is a luminance level that is higher than the luminance level when the applied voltage is 0V.

Group 25, claims 150-152, drawn to a method for manufacturing a display element comprising the steps of partially forming a resin layer on a substrate; providing the resin layer with substantially symmetric oblique faces; and forming a shape having a non-symmetric cross section by eliminating at least a portion of the resin layer.

5. The inventions listed as Groups 1-25 do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Regarding Groups 1, 2, 5, 6, 8, 10, 11, 13, 14, and 16-25: As demonstrated by the "X" and "Y" references on the International Search Report, the special technical feature is anticipated or obvious in view of the 31 cited relevant documents. Consequently, the special technical feature of the invention does not provide an improvement over the prior art.

Regarding Groups 3, 4, 7, 9, 12, and 15 (which were found in the International Search Report to provide both novelty and an inventive step over the prior art):

Group 3 is the one and only group with the special technical feature of a reflective liquid crystal display element satisfying the relation $50\exp(-0.4d) < SG < 360\exp(-0.47d)$, wherein d is a thickness of the polymer-dispersed liquid crystal layer and SG is a scattering gain of the polymer-dispersed liquid crystal layer.

Group 4 is the one and only group with the special technical feature of a reflective liquid crystal display element satisfying the relation $50\exp(-1.6\Delta n \cdot d) < SG < 360\exp(-1.88\Delta n \cdot d)$, wherein $d(\mu m)$ is a thickness of the polymer-dispersed liquid crystal layer, SG is a scattering gain of the polymer-dispersed liquid crystal layer, and Δn is its refractive index anisotropy.

Group 7 is the one and only group with the special technical feature of a reflective liquid crystal display element comprising an RGB filter formed on one of the substrates; wherein, when $d(\mu m)$ is a thickness of polymer-dispersed liquid crystal layer, and, among the scattering gains for green light in the polymer-dispersed liquid crystal layer, SG_r is a scattering gain of a red pixel region, SG_g is a scattering gain of a green pixel region, and SG_b is a scattering gain of a blue pixel region, then $50\exp(-0.4d) < SG_g < 360\exp(-0.47d)$ is satisfied in the green pixel region; $50\exp(-0.4d) < SG_b < 360\exp(-0.47d)$ is satisfied in the blue pixel region; and $40\exp(-0.3d) < SG_r < 650\exp(-0.4d)$ is satisfied in the red pixel region.

Group 9 is the one and only group with the special technical feature of a scattering display element wherein a surface of an anisotropic transmission means is provided with protrusions whose curvature in a horizontal direction of the display screen is larger than the curvature in a vertical direction of the display screen.

Group 12 is the one and only group with the special technical feature of a scattering display element wherein the incidence angle is different from the emission angle; and the emission angle modification means is configured such that light that is incident on the scattering display element is emitted substantially in a direction back toward the direction of incidence.

Group 15 is the one and only group with the special technical feature of forming a resin layer with substantially oblong planar shapes on a substrate; and providing the resin layer with flowability by heating and softening the resin layer, such that a curvature of the planar shapes with respect to a longitudinal direction is smaller than a curvature of the planar shapes with respect to a width direction.

6. This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

The species are as follows:

Species I, drawn to a reflective liquid crystal display element.

Species II, drawn to a scattering display element.

Species III, drawn to a method for manufacturing a display element.

Species IV, drawn to a scattering-mode liquid crystal display device.

Species V, drawn to a method for driving a scattering-mode liquid crystal display device.

Applicant is required, in reply to this action, to elect a single species to which the claims shall be restricted if no generic claim is finally held to be allowable. The reply must also identify the claims readable on the elected species, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered non-responsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the

limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

7. The claims are deemed to correspond to the species listed above in the following manner:

Species I: Claims 5-32.
Species II: Claims 33, 34, 36, 38-41, and 43-71.
Species III: Claims 72-96 & 150-152.
Species IV: Claims 97-129 & 136-149.
Species V: Claims 130-135.

There are presently no generic claims.

8. The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: *See the reasoning applied in the above restriction requirement of Groups 1-25.*

9. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Piziali whose telephone number is (703) 305-8382. The examiner can normally be reached on Monday - Friday (6:30AM - 3PM).


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bipin Shalwala can be reached on (703) 305-4938. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.



J.P.

3 December 2003



BIPIN SHALWALA
SUPERVISORY PATENT EXAMINER
TECHNICAL CENTER